Endangered Species UPDATE

Including a Reprint of the latest USFWS Endangered Species Technical Bulletin

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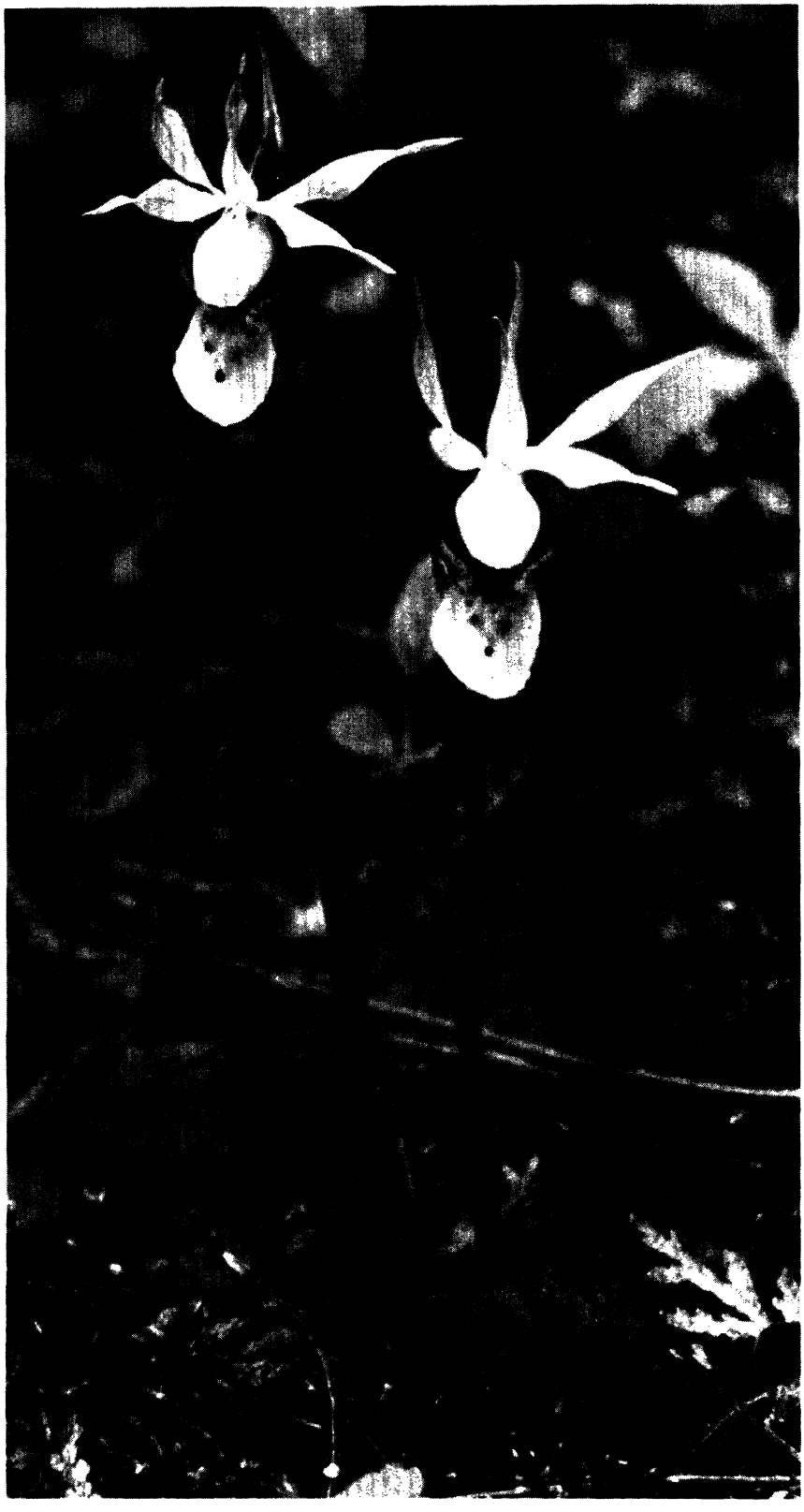
School of Natural Resources



In this Issue:

Are Small Reserves Worthwhile for Plants?

by Anton A. Reznicek

Among the multitude of factors involved in efforts to ensure the survival of threatened and endangered species, habitat protection is the most basic. It has long been understood that simply setting aside a piece of land with a specific rare species is inadequate in many cases. Due to the increase in "insularity" of natural habitats in populated regions as well as a flourish of interest in island biogeography, size and, to some extent, shape have been increasingly recognized as important factors in reserve design.

Yet the problem of size raises new questions concerning species preservation, the most basic of which is how big an area is big enough? For many people, the answers to this question lay in the equilibrium theory of island biogeography. Although the areas derived vary depending on the assumptions used, areas stated in answer to the question are relatively large, usually on the order of many hectares. Conservationists who argue for exclusively large reserves also usually suggest, again because of insularity, that single larger reserves are better than several smaller ones (Wilson and Willis 1975). While many in academic circles realize that most of the arguments against smaller areas are based on largely untested models, especially when applied to plants, this has not stopped many governments and private conservation organizations from adopting the view that small areas are not worth bothering with. This raises a second important question which has received less attention than the first: If, in a densely populated or heavily agricultural region where there are no large natural tracts, is the region abandoned as far as natural area protection goes?

Of course, it is desirable to set aside reserves with as large an area as possible, but this is quite a different issue from whether or not small reserves are worthwhile, particularly for plants. The following thoughts focus on the latter issue. The intention is not to change the focus of conservation in favor of small reserves; indeed, this would constitute a step backwards. Rather it is to expand the range of options available for species conservation. Given the magnitude of the problem of species extinction, conservation efforts must be opportunistic as well as idealistic.

Small areas that host rare plant species and rare plant communities, however, should not be "written off" as potential reserves because island biogeography suggests that the sites are too small for long-term retention of species diversity.

There is no doubt that for moose, wolves, or even warblers, enormous areas must be available to assure survival. Small areas that host rare plant species and rare plant communities, however, should not be "written off" as potential reserves because island biogeography suggests that such sites are too small for long-term retention of species diversity. Given lack of external perturbations, it has never been demonstrated that small sites have a smaller chance of retaining the plant species that occur there than larger sites (Simberloff and Gotelli 1983). Many experienced field botanists are aware of this. They see exquisite prairie relicts sometimes only a few hundred square meters in areas, or even smaller, packed with rare plants. They see a short strip of sandy lakeshore only a few meters wide with numerous rare plants. Cliffs with ledges offering in total only a few square meters of habitat may, on Lake Superior, contain a number of rare arctic-alpine species on, or in the tropics, may have endemic species. In some cases, there is evidence (albeit usually circumstantial) that the plants have survived in these sites for millennia. Furthermore, in any given type of plant community, even the tiniest sites may have rare species. Indeed there are some distinctive plant communities that never occur over large areas, and many plant species that are endemic to miniscule areas. In a few instances that have been carefully studied, such as spruce-fir forests on mountain tops in the southern Appalachians, small areas may even have disproportionately large species counts (White et al. 1984).

There are several features exhibited by plants but not by animals that account for the above observations. First, many perennial plants have an almost indefinite lifespan, often orders of magnitude longer than animals (Coville 1919, Shull 1924, Mark et al 1985) . Alternatively, plants that are short-lived often have seed pools that can persist for decades or perhaps centuries. This means that failure to reproduce for long periods of time, even decades or centuries may not be fatal. Various forms of vegetative reproduction also enable many plants to expand within their habitat even if sexual reproduction and dispersal do not occur.

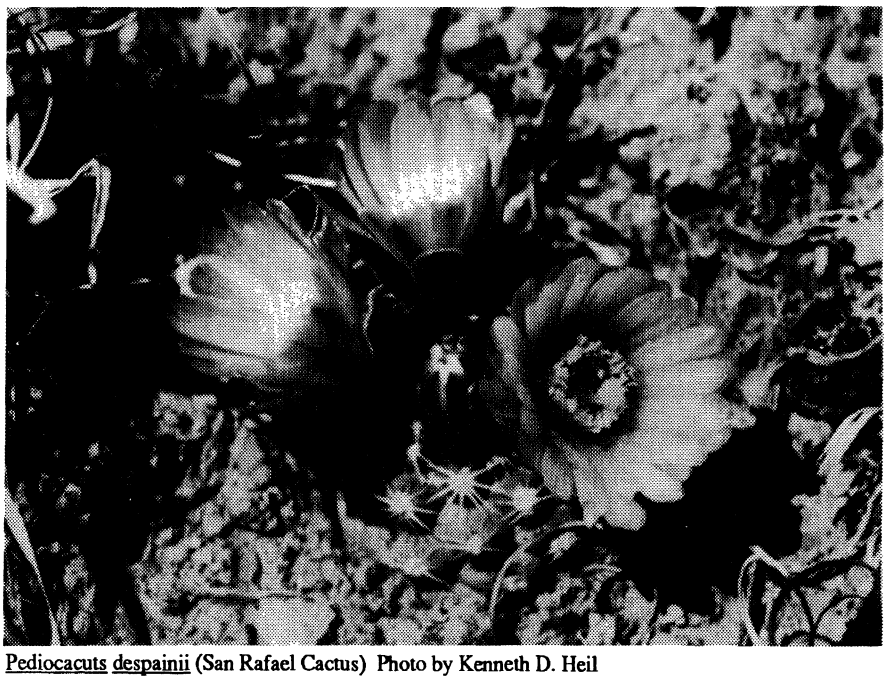
Second, there is little evidence that inbreeding causes disastrous effects in

plants. Many plants are obligatory or facultative inbreeders. Many of the most ineradicable introduced weeds probably originated through the introduction of a few individuals. Yet in spite of such severe population bottlenecks, these species have shown no lack of vigor. Some plants may even have wholly homozygous, but healthy, populations (Brown 1978). Furthermore, the concept that relictual species such as ginkgo or giant redwood are genetically senile is long outmoded.

These first two factors suggest that low numbers of individuals do not inherently endanger plant populations if plant habitats are protected. A third distinction between plants and animals is that the ratio of habitat required to body size is very low in plants. A skunk cabbage (Symplocarpus foetidus) may live for several centuries occupying a seep in a forest hardly larger than the one meter diameter of its foliage rosette. A Kirtlands's warbler (Dendrocia kirtlandii), perhaps a hundred times smaller than a skunk cabbage, requires up to thirty acres of summer territory alone. In short, a lot more plants than animals fit into a small area.

Finally a fourth factor that may apply, in some cases, is that a single population of plants has only one habitat. Plants are rooted in place. A population of larger animals may require more than one habitat. Some animals breed in a different habitat than they feed. Others occupy different habitats at different times in their life cycles.

These four points add up to radical differences in habitat area and habitat requirements between plants and animals. They also suggest that extinction rates for many plants should be low and remain relatively constant even over a very large range of preserve sizes. The present day conditions of vegetation remnants and their floras confirm these deductions. In Michigan for example, it is clear that many of the small areas of homogeneous plant communities existing today are probably remnants of formerly larger areas. This is due both to the retreat of formerly widespread communities such as prairies to small remaining areas of suitable habitat as environmental conditions changed (Transeau 1935, Anderson 1983) and to the fragmentation of plant communities such as deciduous forest due to settlement. The plants constituting these communities were presumably distributed more or less evenly, albeit at varying frequencies, in the original, larger areas where environmental conditions were appropriate for particular species or communities. Therefore, based on basic probability theory, the initial reduction in areas, even if by a large factor, would eliminate only a few species. Those still present should, following the above argument, survive in the



Pediocacuts despainii (San Rafael Cactus) Photo by Kenneth D. Heil

Endangered Species UPDATE

A forum for information exchange on endangered species issues

December 1987
Vol. 5 No. 2

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Instructions for Authors:

The Endangered Species UPDATE welcomes articles related to species protection in a wide range of areas including but not limited to: research and management activities for endangered species, theoretical approaches to species conservation, and habitat protection and preserve design. Book reviews, editorial comments, and announcements of current events and publications are also welcome.

Readers include a broad range of professionals in both scientific and policy fields. Articles should be written in an easily understandable style for a knowledgeable audience. Manuscripts should be 9-12 double spaced typed pages. For further information please contact Kathryn Kohm at the number listed below.

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Cover:

Calypso bulbosa

Photo by Jim Weber

smaller area as long as suitable conditions exist. The most recent list of Michigan's endangered and threatened vascular plants, for example, contains only four deciduous forest species which are thought to be extirpated (although many more are now very rare). This is in spite of the fact that the deciduous forests of southern Michigan, the richest in the state, have been decimated, and only a small fraction of their original areas remain intact. If further degradation of deciduous forest does not occur, is the deciduous forest flora of Michigan still doomed to inevitable decline simply because of forest fragmentation? The answer, I believe, is no.

Of course, there are several qualifications that might be attached to this conclusion. In tropical areas, much more impact would be expected from vegetation fragmentation, but this is because the flora is so much more diverse and, much more regional endemism exists, not because the underlying principles have changed. Similarly, there are secondary effects of fragmentation such as fire suppression or the interuption of plant-animal interactions that may cause species or communities to decline. However, some of these effects, such as disturbance, can be alleviated through management techniques.

Small Reserves for Plants: Advantages & Disadvantages

For plants, at least, small reserves are acceptable if they can be protected and if larger areas are nonexistent. This should be good news to conservation-oriented botanists. It means that plant communities and rare plants in regions with no large natural tracts should still be considered for protection. In some cases, certain plants can be protected with smaller expenditures of money. A major point to be made here is that with smaller reserves there may be more choices of sites and ideally, several high quality sites can be protected. Several smaller sites will also normally contain more plant species than one large site even if total areas are the same (Higgs and Usher 1980, Jarvinen 1982). Furthermore a species with populations protected at several sites is less susceptible to disaster than a species with a single protected population, even in a larger site. This latter point is a pragmatic one that applies to all organisms. At least for plants, it is thus all the more frustrating when policy based on theoretical grounds forces abandonment of high quality smaller sites.

At the same time, there are certainly problems with small sites. These problems, however, are not related to an inexorable decline in species richness. If a site is too tiny, small scale events such as incidental camping, brush and rubbish dumping, and collecting can destroy it, as can small scale natural disasters. It can be an administrative nightmare to coordinate diverse management of scattered small sites. Certain types of management may be intrinsically more difficult or inefficient on small sites. Additionally, small sites might be less resistant to alterations in drainage or other manipulations in adjacent areas, and they might, in some instances, require larger buffer zones. Lastly, a small reserve is a smaller target for propagules, and recruitment of species into the reserve may be abnormally low.

There are also disadvantages to large sites including cost and availability. If a large site is invaded by a severe pest, such as an agressive introduced shrub, control will likely be more difficult. Also, inevitably, there are fewer large reserves. This may be a problem in terms of diversity as well as unforeseen disasters.

I certainly do not suggest that since small areas are possible as reserves for plants, it is acceptable to allow more extensive development. In those regions fortunate enough still to have large tracts of natural land for reserves, we would certainly concentrate on larger areas. Even in those regions, however, there may be small special sites worthy of protection (although these perhaps could be imbedded within larger areas). My aim is to emphasize that in areas where only smaller tracts now exist, botanists at least, should have hope. These small tracts can retain their species richness if protected and properly managed. There are circumstances where there may be good reasons for not trying to protect small areas, but the inevitable loss of botanical diversity is not one of those reasons. Is it worth protecting a site of botanical interest as small as a hectare? If there are no alternatives, Yes!

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Letters

Looking Beyond Species-Oriented Conservation

The article by Hutto et al. (" A Critical Evaluation of the Species Approach to Biological Conservation," Endangered Species UPDATE, 4(12):1-4, 1987) raises an important issue for both conservationists and managers: saving endangered or indicator species is not the same as preserving biological diversity (see also Noss and Harris, 1986; Scott et. all., 1987). The last two years have seen a flurry of conferences addressing the "biodiversity crisis," but little attention has been paid to distinguishing between species-oriented (which is often *ex situ*) and ecosystem conservation. Yet, as Ehrlich and Ehrlich (1981) point out, "If the goal is to save biological diversity, the major focus must be on conserving entire ecosystems."

The reasons for the current focus on species are both conceptual and pragmatic. No accepted system exists for describing the earth's ecosystems on a scale practical to conservation, nor is there a consistent approach for their inventory or monitoring. Species, on the other hand, are (ideally) discrete units, easily tracked by standard botanical and zoological field methods. Further, it is easier to argue for funding to save charismatic species than to save the abstractions we call ecosystems. It is no accident that there are only 13 insects among the 967 taxa listed in 1988 as threatened or endangered by the U.S. Fish and Wildlife Service.

Attempts have been made to approach conservation at a higher level, but even the 227 biogeographic provinces developed for the international Union for the Conservation of Nature and Natural Resources (Udvardy, 1984) include many continental areas so large that a single preserve would capture only a small fraction of that province's biological diversity. Meanwhile, although The Nature Conservancy classifies and ranks natural communities according to rarity at local, state, and global scales, and the U.S. Fish and Wildlife Service acquisition programs have done much to protect grassland and wetland communities, most conservation funding in North America is directed towards a few large or glamorous species (e.g. California condor, black-footed ferret, bald eagle, grizzly bear) that are either on the brink of extinction (condor, ferret) or threatened with extirpation in parts of their range (eagle, bear). This application of conservation resources seems to have little relation to the much touted goal of "saving biological diversity." Although the threat to biodiversity through ecosystem degradation is most severe in the tropics, we hardly have our house in order. The original herbaceous understory has disappeared from most western rangelands, and old growth forests are treated as non-renewable resources, to be mined rather than managed. As long as single-minded species management dominates land-use decisions, the status of myriad unmonitored species will continue to deteriorate, along with ecosystem integrity.

We applaud Hutto et al. for taking a stand in favor of a broader approach to the biodiversity crisis. Many temperate and tropical ecosystems remain unprotected. A variety of methods are available for identifying holes in the global safety-net (e.g. Diamond, 1986, Scott et. al., 1987, Terborgh and Winter, 1983). It is time for conservation biologists to recognize the impracticality of saving biological diversity by focusing on single species management. Without writing off endangered or narrowly-distributed species, we can redirect most conservation resources to areas whose protection will insure that growth of the list of endangered species is curtailed.

Species-oriented conservation has served its purpose in raising public awareness about the loss of biological diversity. It is time for a more balanced approach.

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Book Review

Audubon Wildlife Report 1987

Robert L. Di Silvestro, Editor

The Audubon Wildlife Report 1987 is an excellent, detailed reference for students and professionals. As in previous years, this year's report proves to be a useful repository of the wildlife conservation events of the preceding year. It contains a wealth of practical information on wildlife conservation in a range of public programs.

The Report is divided into four sections. This year, the opening section features the Bureau of Land Management. The Bureau's history is explained along with its current budgets, functions, plans, and responsibilities .

Federal agencies and programs involved in the issues of wildlife conservation constitute the second segment of the Report. The fourteen subjects discussed include (but are not limited to) migratory bird protection and management, marine mammals protection, water projects and wildlife , the National Wildlife Refuge System, and international wildlife conservation. Each of these chapters is organized into four parts: an overview and a discussion of current developments, legislative developments, and legal developments.

The third section of the book is composed of Species Accounts. This year, thirteen animals and two plants are discussed in terms of six common categories: a species description and natural history, biological and human significance, historical perspective, current trends, management prognosis, and recommendations.

Finally, the fourth section of the Report includes a series of appendices. This section brings together a host of valuable information that is otherwise scattered throughout government bureacracies. The appendices are one of the most valuable aspects of the Report. Information includes directories for thirteen agencies as well as personnel contacts and budget data, an updated version of the Federal Endangered and Threatened Species List, and a status report on all National Forest plans and appeals.

The Wildlife Report 1987 is published by Academic Press Inc. in Orlando Florida. The 1985 Report featuring the U.S. Fish & Wildlife Service and the 1986 Report featuring the U.S. Forest Service are also still available.

Inventory and Monitoring of Wildlife Habitat

A. Cooperrider, R. Boyd, & H. Stuart, Editors

Published by the Bureau of Land Management, Inventory and Monitoring of Wildlife Habitat is a comprehensive guidebook intended to aid field biologists and managers in planning, organizing, and administering wildlife inventory and monitoring projects. Toward these ends, the book reviews current general procedures and specific techniques. The editors caution, however, that it is not designed as a "cookbook." Based on the recognition that nature is complex, diverse, and dynamic, no attempt is made to standardize techniques.

An overriding concern in the design of the book was to cover the process of inventory and monitoring in its entirety, i.e. from initial problem identification through presentation of results.

The book is modular; chapters can be read either alone or in combination for general guidance or as a reference source. As a reference source, a chapter may contain a detailed description of a technique or refer the reader to another source containing a description. This depends on the amount of work available on the subject, the detail involved, and the availability of good descriptions in readily accessible publications.

The book is divided into six major sections. Section I covers general procedures for planning; Section II contains information for inventorying and monitoring particular habitats; Section III provides guidance on inventorying and monitoring particular animal groups; Section IV describes techniques for measuring habitat variables; Section V covers special monitoring studies; and Section VI provides information on techniques and procedures for analysis, evaluation, interpretation, and presentation of data and results.

Inventorying and Monitoring of Wildlife Habitat is available for $38 from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402. The GPO Stock # is 024-011-00170-1. For further information contact the authors at (303) 236-0161 or (303) 236-6310.

Significant Trade in CITES Appendix II Species

by Amie Brautigam

IUCN's Conservation Monitoring Centre (CMC) in Cambridge, U.K. is putting the finishing touches on a report that promises to be of considerable interest and utility to the conservation community. To be entitled "Significant Trade in CITES Appendix II Species," the report is the result of several years of research and inquiry carried out under the aegis of a working group established under the Convention on International Trade in Endangered Species (CITES). It represents the first systematic attempt to place international commercial trade in the context of species' biological status.

Although CITES essentially aims at regulating trade to maintain sustainable levels for wild populations, little has been done in the years since the treaty's inception to assess its fulfillment of that goal. Despite the removal of numerous species from international commercial trade (through transfer from Appendix II to Appendix I), the pace of wildlife commercialization in terms of species number and variety has far surpassed scientific and regulatory achievements.

Not surprisingly, some of the preliminary results of the CITES Significant Trade Study presented to the CITES Technical Committee in 1986 revealed a profound lack of knowledge about many species in international commercial trade. Of the 145 species investigated by CMC, eleven were identified as probably subject to unsustainable levels of trade (these are know as category 1 species). Eighty-five others were classified in a group for which too little biological information exists to allow for an assessment of the threat to their survival posed by trade (category 2 species).

Six of the eleven species classified in the 1986 draft as category "1" and 45 of the 85 species in category "2" were avian species. Two of the former, the hyacinth macaw (Anodorhynchus hyacinthinus) and palm cockatoo (Probosciger aterrimus), were recently transferred to Appendix I; a third, the blue-fronted Amazon (Amazona aestiva), traded in numbers ranging from 10,664 in 1981 to 37,322 in 1984, was moved by the Committee to category "2." The category "2" avian species traded in highest numbers from 1980-1984 were: Fischer's lovebird (Agapornis fischeri), in numbers ranging from 11,438 in 1981 to 56,218 in 1982, and the African grey parrot (Psittacus erithacus), in numbers ranging from 25,760 in 1981 to 46,294 in 1983.

Of the reptilian taxa, tegu lizards (Tupinambis spp.) and the spectacled caiman (Caiman crocodilus), both traded in an average of some 1 million skins per year through 1984, were judged as probably subject to over-exploitation. Projects currently underway are aimed at establishing management schemes and assessing the biological status of both these taxa. The category "2" reptilian species figures include: the Nile monitor lizard (Varanus niloticus), traded in 1980-1984 at an annual average of 404,907 skins; the reticulated python (Python reticulatus), in which the annual trade in 1980-1984 averaged approximately 297,000 skins; and the boa constrictor (Boa constrictor), traded in 1980-1984 at up to 100,000 skins per year. Additionally, live boa constrictors were taken for pet trade in numbers ranging from 20,000 in 1980 to 4,709 in 1984.

The ramifications for CITES of the CMC report's findings are not reassuring. The Convention specifically requires that the export of any specimen of a species included in Appendix II be permitted only on prior grant and presentation of an export permit. According to the Convention, these permits "shall be granted when [first] a scientific authority of the state of export has advised that such export will not be detrimental to the survival of that species." This "non-detriment" finding forms a cornerstone of CITES. Yet, it is apparently being ignored.

The lack of necessary baseline data to assess sustainable levels of exploitation places the conservation community in a considerable quandary. Costly status surveys for apparently very common species are increasingly difficult to fund. However without such information, policy makers are at a loss in determining appropriate trade controls.

The CITES Parties have endorsed the working group's recommendations that the Secretariat seek the necessary funding for projects investigating the status and trade of certain priority taxa including: Asian Varanids, several southeast Asian and South American parrots, Asian pythons, and South American boids. The first such project was scheduled to begin in July 1987; additional funding is being sought for the remaining projects.

For biologists never having feared for the survival of the green iguana, the reticulated python, or the African grey parrot, the Significant Trade Report may prove very enlightening. It is hoped that in addition to its value as a reference, this report will elicit a more profound commitment to study and implemention of management programs or other conservation measures for apparently less threatened species.

Amie Brautigam is Coordinator of the IUCN/SSC Trade Specialist Group c/o Center for Environmental Education

Publication of the report on Significant Trade in CITES Appendix II Species is scheduled for May 1988. For further information on its availability, contact Wildlife Trade Monitoring Unit, IUCN Conservation Monitoring Center, 219c Huntington Rd., Cambridge CB3 ODL, U.K.

Bulletin Board

1986 ESTB Index Available

Each year, the U.S. Fish and Wildlife Service publishes a complete index of articles covered in the Endangered Species Technical Bulletin during the previous year. We now have a limited number of these indexes available for the 1986 bulletins (Volume XI). Species are indexed by both scientific and common names.

This nine-page index is an excellent reference for locating information on federal programs as well as status reports on specific species on the Federal Endangered and Threatened Species List. To obtain a copy of the index, send a self-addressed stamped envelope to the Endangered Species Update, School of Natural Resources, The University of Michigan, Ann Arbor, MI 48109-1115.

The 53d North American Wildlife & Natural Resources Conference

This conference will be held on March 18-23 at the Galt House Hotel in Louisville, Kentucky. The international meeting's theme is "New Approaches in Managing Natural Resources." For more information, contact: Laurence R. Jahn, Chairman, Program Committee, Wildlife Management Institute, Suite 725, 1101 14th Street N.W., Washington D.C. 20005, (202) 371-1808.

The 64th Annual Meeting of the Southwestern & Rocky Mountain Division, AAAS

The 64th annual meeting of the Southwestern and Rocky Mountain Division, American Association for the Advancement of Science, will be held in Wichita, Kansas on March 29-April 2, 1988. Topics discussed will include genetic resources, biological diversity, and agricultural research. For more information, contact: Janis Alcorn, Department of Biology, Tulane University, New Orleans, LA 70118; (504) 865-5546.

Translating Conservation Biology Into Conservation Management, The 2nd Annual SCB Conference

The 2nd Annual Conference of the Society for Conservation Biology will be held at the University of California at Davis, August 16-19, 1988, in conjunction with the 39th Annual AIBS Meeting. The overall meeting theme is biological diversity. For more information, contact: Christine Schonewald-Cox, NPS/CPSU Ecology Institute, Wickson Hall, University of California, Davis, CA 95616.

Riparian Systems Conference Set for Sept.

On September 22-24, 1988, University Extension at UC Davis will be hosting the 2nd "California Riparian Systems Conference." This event will report on issues surrounding the destruction of streamside lands, and on progress made in learning to manage these resources since the 1st conference in 1981. Also discussed will be new concerns for restoration of riparian habitats.

The conference schedule combines professionally oriented daytime programs Thursday and Friday, with seminars to bring professionals, activists, and the general public closer together. For more information, contact Dana Abell at (916) 752-3098.

This month's bulletin Board information was partially provided by Jane Villa-Lobos, Smithsonian Institution

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